MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2017/2018

DCT5038 – DATA COMMUNICATIONS AND NETWORKING

(DIT & DBIS)

1 JUNE 2018
9:00 a.m. – 11:00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT:

1. This question paper consists of **THREE (3)** pages.
2. There are **FIVE (5)** structured questions in this paper. Each question carries total of **20 Marks**.
3. Answer **ALL** questions in the **Answer Booklet** provided.

Structured Questions [100 marks]

*Instruction: Write your answers in the **Answer Booklet.***

Question 1

a) Draw and briefly explain for the following types of data flow.

i. Simplex mode
ii. Half-Duplex mode
iii. Full-Duplex mode

(9 marks)

b) Differentiate between analog signals and digital signals.

(4 marks)

c) A signal travels from point A to point B. At point A, the signal power is 100W. At point B, its power is reduced to half. What is the attenuation in decibel?

(2 marks)

d) Calculate the transmission time for a 30 kbyte message if the bandwidth of the network is 1 Mbps. Assume that the distance between the sender and the receiver is 8500 km and that light travels at $4 \times 10^8 m/s$, what is the propagation time? Write your answer in milliseconds (ms).

(5 marks)

[TOTAL 20 MARKS]

Question 2

a) ***Figure 1*** shows a Return to Zero (RZ) encoding for a digital transmission system.

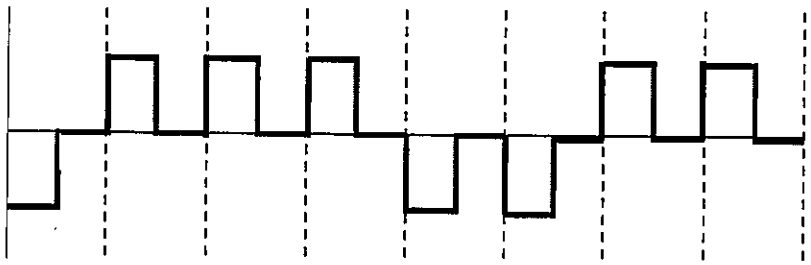

Figure 1

i. Determine the data stream for RZ encoding in ***Figure 1.*** (2 marks)
ii. Convert the RZ encoding into Manchester encoding. (4 marks)

b) Using Nyquist theorem, calculate the sampling rate for a signal with a bandwidth of 8000Hz (4000Hz to 12,000Hz).

(2 marks)

Continued...

c) Differentiate between parallel transmission and serial transmission.

(2 marks)

d) A 8-PSK is used in a digital-to-analog conversion process.

i. Calculate the number of bits require for one baud? (2 marks)
ii. Draw the constellation diagram for 8-PSK. (4 marks)
iii. If the bit rate is 7200 bps, what is the baud rate? (2 marks)
iv. State the difference between bit rate and baud rate. (2 marks)

[TOTAL 20 MARKS]

Question 3

a) Given the following information, find the maximum bandwidth for each signal source. Write your answer in kHz.

- FDM multiplexing
- Total available bandwidth = 7.9 kHz
- Three signal sources
- A 200-Hz guard band between each signal source

(3 marks)

b) What is Wave-division Multiplexing (WDM)? Give **ONE** application of WDM.

(2 marks)

c) Given the following information, draw the TDM frames showing the character data.

Four signal sources:

- Source 1 message: T E G
- Source 2 message: F
- Source 3 message:
- Source 4 message: E J I K

(5 marks)

d) Briefly explain **TWO** modes of transmission in fiber-optic cable.

(4 marks)

e) State the difference between radio waves and microwaves in terms of frequency, direction and bandwidth.

(6 marks)

[TOTAL 20 MARKS]

Continued...

Question 4

a) Given a dataword 10110100 and the divisor 1101. By using CRC error detection method, show the generation of the codeword to be transmitted at sender site.
(6 marks)

b) Given a bit stream of 10101101 00110110, identify the checksum that will be send by the sender. Check your answer to determine whether the received pattern has no error.
(5 marks)

c) Define Automatic Repeat Request (ARQ) and list **THREE** types of ARQ.
(5 marks)

d) Draw the Stop-and-Wait ARQ diagram to illustrate the situation when the frame is lost.
(4 marks)

[TOTAL 20 MARKS]

Question 5

a) Explain how Carrier Sense Multiple Access (CSMA) nonpersistent strategy can solve the problem if the channel is busy.
(3 marks)

b) List **ONE** advantage and **ONE** disadvantage of using Carrier Sense Multiple Access (CSMA) nonpersistent strategy.
(2 marks)

c) Token-passing is one of the popular controlled-access methods. Draw **TWO** types of the diagram of token-passing access method.
(5 marks)

d) Packet-switched network can use two different approaches to route the packets: datagram approach and virtual circuit approach. Give **TWO** characteristics for each type of the approaches.
(4 marks)

e) For communication in virtual circuit switching, a source and destination need to go through three phases. List and briefly explain the **THREE** phases.
(6 marks)

[TOTAL 20 MARKS]

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